AMENDMENTS TO THE CLAIMS:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Claim 1 (previously presented): A communication device for use in a communications system that uses multiple tones distributed over a predetermined bandwidth to communicate data, the device comprising:

a mapping circuit that receives data symbols and maps the symbols to prescribed time instants in a predetermined time interval to generate a discrete signal including mapped symbols, each mapped symbol corresponding to a discrete point in time;

an interpolation circuit that receives the discrete signal and generates a continuous signal by applying an interpolation function to the discrete signal, the interpolation function operating on the discrete signal such that a frequency response of the continuous signal includes sinusoids having non-zero values at a first set of tones, the first set of tones being a subset of said multiple tones, the non-zero value at each of said first set of tones being a function of a plurality of mapped symbols corresponding to different discrete points in time, the frequency response of the continuous signal also including zero values at a second set of tones, the second set of tones being different from said first set of tones and being another subset of said multiple tones; and

a cyclic prefix circuit located after the interpolation circuit to prepend a cyclic prefix.

Claim 2 (previously presented): The device of claim 1 wherein the discrete time instants are defined within the range of 0, T/N, 2T/N, …, T(N-1)/N, where N is a total number of time instants in the predetermined time interval.

Claim 3 (previously presented): The device of claim 1 wherein the frequency tones within the first set of tones are contiguous frequency tones, and the prescribed time instants are equally spaced and uniformly distributed over one symbol duration.

Claim 4 (previously presented): The device of claim 1 wherein the frequency tones within the first set of tones are equally spaced frequency tones, and the prescribed time instants are equally spaced and uniformly distributed over a fraction of one symbol duration.

Claim 5 (previously presented): The device of claim 4 wherein a fraction of one symbol duration is defined by 1/L where L is the spacing between two adjacent tones in the first set of tones.

Claim 6 (previously presented): The device of claim 1 wherein a total number of discrete time instants is greater than or equal to a total number of frequency tones distributed over the predetermined bandwidth.

Claim 7 (previously presented): The device of claim 1 wherein the interpolation circuit further includes a memory for storing the predetermined interpolation functions, and an interpolation function module for retrieving the interpolation functions from the memory and applying the

interpolation functions to the discrete signal to generate the continuous signal.

Claim 8 (previously presented): The device of claim 7 wherein the interpolation functions comprise a matrix of precomputed sinusoidal waveforms.

Claim 9 (previously presented): The device of claim 7 wherein the interpolation functions comprise continuous interpolation functions.

Claim 10 (previously presented): The device of claim 1 wherein the mapping circuit replicates the discrete signal of mapped symbols to generate an infinite series of mapped symbols over prescribed time instants covering a time interval from $-\infty$ to $+\infty$.

Claim 11 (previously presented): The device of claim 10 wherein the interpolation functions comprise sinc interpolation functions, and the interpolation circuit applies the sinc interpolation functions to the infinite series of mapped symbols.

Claim 12 (previously presented): The device of claim 1 wherein the data symbols are complex symbols associated with a symbol constellation.

Claim 13 (previously presented): The device of claim 1 further including a digital signal processor for implementing the mapping circuit and the interpolation circuit.

Claim 14 (previously presented): The device of claim 1 wherein said interpolation circuit includes a sampling circuit for sampling the continuous signal to produce a digital signal sample vector; and wherein the cyclic prefix circuit receives the digital signal sample vector from the sampling circuit and prepends the cyclic prefix to the digital signal sample vector.

Claim 15 (previously presented): The device of claim 14 wherein the cyclic prefix circuit operates to copy an end portion of the digital signal sample vector and prepend the end portion to a beginning portion of the digital signal sample vector.

Claim 16 (previously presented): The device of claim 1, wherein said interpolation circuit includes a sampling circuit for sampling the continuous signal to produce a digital signal sample vector, the device further including a digital to analog converter operable to receive the digital signal sample vector and generate an analog signal for transmission.

Claim 17 (previously presented): A communication system for generating an OFDM signal having allocated frequency tones distributed over a predetermined bandwidth, the communication system comprising:

a mapping module that receives data symbols from a symbol constellation and maps the symbols to prescribed time instants in a time domain symbol duration to generate a discrete signal of mapped symbols;

an interpolation module that receives the discrete signal and generates a continuous signal by applying an interpolation function to the discrete signal;

wherein the interpolation function operates on the discrete signal such that a frequency response of the continuous signal includes sinusoids having non-zero values at the allocated frequency tones, and zero values at frequency tones other than the allocated frequency tones; and

a cyclic prefix circuit located after the interpolation module to prepend a cyclic prefix.

Claim 18 (original): The communication system of claim 17 wherein the allocated frequency tones are associated with a designated transmitter within the communication system.

Claim 19 (original): The communication system of claim 17 wherein the allocated frequency tones are contiguous frequency tones, and the prescribed time instants are equally spaced time instants uniformly distributed over one symbol duration.

Claim 20 (original): The communication system of claim 17 wherein the allocated frequency tones are equally spaced frequency tones, and the prescribed time instants are equally spaced time instants uniformly distributed over a fraction of one symbol duration.

Claim 21 (original): The communication system of claim 20 wherein a fraction of one symbol duration is defined by 1/L where L is the spacing between two adjacent allocated frequency tones.

Claim 22 (original): The communication system of claim 17 wherein the interpolation function operates on the discrete signal such that values of the continuous signal at the prescribed time instants are equal to the mapped symbols.

Claim 23 (original): The communication system of claim 17 wherein the interpolation module includes a memory for storing the interpolation function, the interpolation module retrieving the interpolation function from the memory and applying the interpolation function to the discrete signal to generate the continuous signal.

Claim 24 (original): The communication system of claim 23 wherein the interpolation function comprises a sinc interpolation function.

Claim 25 (previously presented): A communication system for generating an OFDM signal having allocated frequency tones distributed over a predetermined bandwidth, the communication system
comprising:

a mapping module that receives data symbols from a symbol constellation and maps the symbols to prescribed time instants in a time domain symbol duration to generate a discrete signal of mapped symbols; and

an interpolation module that receives the discrete signal and generates a digital signal sample vector by applying an interpolation function to the discrete signal;

wherein the interpolation function operates on the discrete signal such that a frequency response of the digital signal sample vector includes sinusoids having non-zero

values at the allocated frequency tones, and zero values at frequency tones other than the allocated frequency tones; and

a cyclic prefix module located after the interpolation module for prepending a cyclic prefix.

Claim 26 (original): The communication system of claim 25 wherein the interpolation module further includes a memory for storing the interpolation function, the interpolation module retrieving the interpolation function from the memory and applying the interpolation function to the discrete signal to generate a digital signal sample vector.

Claim 27 (original): The communication system of claim 26 wherein the interpolation function is a discrete interpolation function comprising a matrix of precomputed sinusoidal waveforms.

Claim 28 (original): The communication system of claim 27 wherein the interpolation module multiplies the matrix of precomputed sinusoidal waveforms with the discrete signal of mapped symbols over the time domain symbol duration to generate the digital signal sample vector.

Claim 29 (previously presented): A communication system for generating an OFDM signal having allocated frequency tones distributed over a predetermined bandwidth, the communication system comprising:

a mapping module that receives data symbols from a symbol constellation and maps the symbols to prescribed time instants in a time domain symbol duration to generate a discrete signal of mapped symbols; and

an interpolation module that receives the discrete signal and generates a continuous signal by applying an interpolation function to the discrete signal;

wherein the interpolation function operates on the discrete signal such that values of the continuous signal at the prescribed time instants are equal to the mapped symbols; and

a cyclic prefix module located after the interpolation module to prepend a cyclic prefix.

Claim 30 (previously presented): A communication system comprising:

a mapping circuit that receives data symbols and maps the symbols to prescribed time instants in a time domain symbol duration to generate a discrete signal of mapped symbols; and

an interpolation circuit that receives the discrete signal and generates a continuous signal by applying an interpolation function that operates on the discrete signal such that a frequency response of the continuous signal includes sinusoids having non-zero values at a first set of tones, and zero values at a second set of tones; and

a cyclic prefix module located after the interpolation circuit to prepend a cyclic prefix.

Claim 31 (previously presented): The communication system of claim 30 wherein the continuous signal comprises an OFDM communication signal and wherein the value of the continuous signal at each of the prescribed time instants is a function of the mapped symbol at said prescribed time instant.

Claim 32 (original): The communication system of claim 30 wherein the first set of tones are allocated to one communication device within the communication system.

Claim 33 (original): The communication system of claim 32 wherein the communication device comprises a transmitter.

Claim 34 (original): The communication system of claim 30 wherein the interpolation circuit is adapted to store the interpolation function.

Claim 35 (original): The communication system of claim 34 wherein the interpolation function is a sinc interpolation function.

Claim 36 (original): The communication system of claim 34 wherein the interpolation function is a matrix of precomputed sinusoidal waveforms.

Claim 37 (original): The communication system of claim 36 wherein the interpolation circuit multiplies the matrix of precomputed sinusoidal waveforms with the discrete signal of mapped symbols over the time domain symbol duration to generate the continuous signal.

Claim 38 (original): The communication system of claim 30 further comprising a sampling circuit that samples the continuous signal at discrete time instants distributed over the time domain symbol duration to generate a digital signal sample vector.

Claim 39 (original): The communication system of claim 38 wherein the discrete time instants are defined within the range of 0, T/N, 2T/N, …, T(N-1)/N, where N is a total number of time instants in the time domain symbol duration.

Claim 40 (original): The communication system of claim 30 wherein the data symbols are complex symbols associated with a symbol constellation.

Claim 41 (previously presented): A communication system comprising:

a mapping circuit that receives data symbols and maps the symbols to prescribed time instants in a time domain symbol duration to generate a discrete signal of mapped symbols; and

an interpolation circuit that receives the discrete signal and generates a digital signal sample vector by applying an interpolation function that operates on the discrete signal such that a frequency response of the digital signal sample vector includes sinusoids having non-zero values at a first set of tones, and zero values at a second set of tones; and

a cyclic prefix circuit located after the interpolation module to prepend a cyclic prefix.

Claim 42 (original): The communication system of claim 41 wherein the interpolation circuit is adapted to store the interpolation function.

Claim 43 (original): The communication system of claim 42 wherein the interpolation function is a matrix of precomputed sinusoidal waveforms.

Claim 44 (original): The communication system of claim 43 wherein the interpolation circuit multiplies the matrix of precomputed sinusoidal waveforms with the discrete signal of mapped symbols over the time domain symbol duration to generate the digital signal sample vector.

Claims 45-49 (canceled)

Claim 50 (previously presented): A method for reducing a peak-to-average ratio in an OFDM communication signal transmitted by a communication device, the method comprising:

providing a time domain symbol duration having equally spaced time instants;

allocating a predetermined number of frequency tones to the communication device;

receiving as input data symbols to be transmitted by the OFDM communication signal;

mapping the data symbols to the equally spaced time instants in the symbol duration to generate a discrete signal of mapped symbols;

generating a continuous signal by applying an interpolation function to the discrete signal, the interpolation function operating on the discrete signal such that a frequency response of the continuous signal includes sinusoids having non-zero values at the allocated frequency tones, and zero values at frequency tones other than the allocated frequency tones; and

sampling the continuous signal at discrete time instants distributed over the time domain symbol duration, to generate a digital signal sample vector; and

prepending a cyclic prefix to the digital signal sample vector produced by sampling the continuous signal after generation of the continuous signal by applying the interpolation function.

Claim 51 (original): The method of claim 50 wherein the discrete time instants are defined within the range of 0, T/N, 2T/N, …, T(N-1)/N, where N is a total number of time instants in the symbol duration.

Claim 52 (original): The method of claim 50 wherein the step of allocating a predetermined number of frequency tones to the communication device further comprises allocating contiguous frequency tones to the communication device.

Claim 53 (original): The method of claim 50 wherein the step of allocating a predetermined number of frequency tones to the communication device further comprises allocating equally spaced frequency tones to the communication device.

Claim 54 (original): The method of claim 50 further including the step of replicating the mapped symbols within the symbol duration to generate an infinite series of data symbols over equally spaced time instants covering a time interval from $-\infty$ to $+\infty$ after the step of mapping the data symbols.

Claim 55 (original): The method of claim 54 wherein the step of generating the continuous signal further comprises applying a sinc interpolation function to the infinite series of data symbols.

Claim 56 (original): The method of claim 50 wherein the discrete signal of mapped symbols includes odd numbered symbols and even number symbols, and further comprises the step of phase rotating each even numbered symbol by $\pi/4$.

Claim 57 (original): The method of claim 50 further comprising the step of mapping the data symbols to a block of complex data symbols wherein the block of complex data symbols includes odd numbered symbols and even numbered symbols;

phase rotating each even numbered symbol by $\pi/4$; and

mapping the block of complex data symbols to equally spaced time instants in the symbol duration to generate the discrete signal of mapped symbols.

Claim 58 (original): The method of claim 50 further comprising the step of offsetting imaginary components of the digital signal sample vector by a predetermined number of samples for producing a cyclic offset in the digital signal sample vector.

Claim 59 (original): The method of claim 58 further comprising the step of fixing a position of real components of the digital signal sample vector with respect to the imaginary components.

Claim 60 (original): The method of claim 58 wherein the predetermined number of samples is an integer number of samples.

Claim 61 (original): The method of claim 58 wherein the predetermined number of samples is a fraction of one sample period.

Claim 62 (original): The method of claim 50 further comprising the step of prepending a cyclic prefix to the digital signal sample vector.

Claim 63 (original): The method of claim 62 wherein the step of prepending a cyclic prefix further comprises copying an end portion of the digital signal sample vector and prepending the end portion to a beginning portion of the digital signal sample vector.

Claim 64 (original): The method of claim 50 wherein the step of allocating a predetermined number of frequency tones includes allocating more tones than a total number of data symbols to be transmitted in the symbol duration.

Claim 65 (original): The method of claim 50 wherein the interpolation function is a raised cosine function.

Claim 66 (original): The method of claim 50 further comprising the step of precomputing the interpolation function and storing the interpolation function in a memory.

Claim 67 (previously presented): A method for reducing a peak-to-average ratio in an OFDM communication signal having a set of tones distributed over a predetermined bandwidth, the method comprising:

defining a symbol duration for the OFDM communication signal;

defining time instants in the symbol duration;

allocating frequency tones from the set of tones to a particular communication device;

receiving as input data symbols from a symbol constellation, the data symbols being transmitted by the OFDM communication signal;

mapping the data symbols to the time instants to generate a discrete signal in the time domain;

generating a digital signal sample vector by applying interpolation functions to the discrete signal such that a frequency response of the digital signal sample vector includes sinusoids having non-zero values at allocated frequency tones, and zero values at frequency tones other than the allocated frequency tones; and

prepending a cyclic prefix to the digital signal sample vector after the digital signal sample vector is generated by applying the interpolation function.

Claim 68 (original): The method of claim 67 wherein the step of allocating frequency tones further includes allocating contiguous tones, and mapping the data symbols to equally spaced time instants distributed over one symbol duration.

Claim 69 (original): The method of claim 67 wherein the step of allocating frequency tones further includes allocating equally spaced tones, and mapping the data symbols to equally spaced time instants distributed over a portion of one symbol duration.

Claim 70 (original): The method of claim 67 wherein the data symbols are complex symbols.

Claim 71 (original): The method of claim 67 wherein the discrete signal includes odd numbered symbols and even number symbols, and further comprises the step of phase rotating each even numbered symbol by $\pi/4$.

Claim 72 (original): The method of claim 67 further comprising the step of mapping the data symbols to a block of complex data symbols wherein the block of complex data symbols includes odd numbered symbols and even numbered symbols;

phase rotating each even numbered symbol by $\pi/4$; and

mapping the block of complex data symbols to equally spaced time instants in the symbol duration to generate the discrete signal.

Claim 73 (original): The method of claim 67 further comprising the step of offsetting imaginary components of the digital signal sample vector by a predetermined number of samples for producing a cyclic offset in the digital signal sample vector.

Claim 74 (previously presented): A communication device for use in a communications system that uses multiple tones distributed over a predetermined bandwidth to communicate data, the device comprising:

a mapping circuit that receives data symbols and maps the symbols to prescribed time instants in a predetermined time interval to generate a discrete signal including mapped symbols, each mapped symbol corresponding to a discrete point in time, each discrete point in time to

which a symbol is mapped not overlapping a discrete point in time to which another symbol is mapped, multiple symbols being mapped to said predetermined time interval, discrete points in time to which symbols are mapped having a predetermined spacing;

an interpolation circuit that receives the discrete signal and generates a continuous signal by applying an interpolation function to the discrete signal, the interpolation function operating on the discrete signal such that a frequency response of the continuous signal includes sinusoids having non-zero values at a first set of tones, the first set of tones being a subset of said multiple tones, the non-zero value at each of said first set of tones being a function of a plurality of mapped symbols corresponding to different discrete points in time, the frequency response of the continuous signal also including zero values at a second set of tones, the second set of tones being different from said first set of tones and being another subset of said multiple tones; and

a cyclic prefix circuit located after the interpolation circuit for prepending a cyclic prefix. Claim

Claim 75 (new): A communication device for use in a communications system that uses multiple tones distributed over a predetermined bandwidth to communicate data, the device comprising:

mapping means for receiving data symbols and mapping the symbols to prescribed time instants in a predetermined time interval to generate a discrete signal including mapped symbols, each mapped symbol corresponding to a discrete point in time;

interpolation means for receiving the discrete signal and generating a continuous signal by applying an interpolation function to the discrete signal, the interpolation function operating on the discrete signal such that a frequency response of the continuous signal includes sinusoids having non-zero values at a first set of tones, the first set of tones being a subset of said multiple tones, the non-zero value at each of said first set of tones being a function of a plurality of mapped symbols corresponding to different discrete points in time, the frequency response of the continuous signal also including zero values at a second set of tones, the second set of tones being different from said first set of tones and being another subset of said multiple tones; and

cyclic prefix means located after the interpolation means for prepending a cyclic prefix.

Claim 76 (new): The device of claim 75 wherein the discrete time instants are defined within the range of 0, T/N, 2T/N, …, T(N-1)/N, where N is a total number of time instants in the predetermined time interval.

Claim 77 (new): The device of claim 75 wherein the frequency tones within the first set of tones are contiguous frequency tones, and the prescribed time instants are equally spaced and uniformly distributed over one symbol duration.

Claim 78 (new): The device of claim 75 wherein the frequency tones within the first set of tones are equally spaced frequency tones, and the prescribed time instants are equally spaced and uniformly distributed over a fraction of one symbol duration.

Claim 79 (new): The device of claim 78 wherein a fraction of one symbol duration is defined by 1/L where L is the spacing between two adjacent tones in the first set of tones.

Claim 80 (new): The device of claim 75 wherein a total number of discrete time instants is greater than or equal to a total number of frequency tones distributed over the predetermined bandwidth.

Claim 81 (new): The device of claim 75 wherein the interpolation means further includes storage means for storing the predetermined interpolation functions, and an interpolation function means for retrieving the interpolation functions from the memory and applying the interpolation functions to the discrete signal to generate the continuous signal.

Claim 82 (new): The device of claim 81 wherein the interpolation functions comprise a matrix of precomputed sinusoidal waveforms.

Claim 83 (new): The device of claim 81 wherein the interpolation functions comprise continuous interpolation functions.

Claim 84 (new): The device of claim 75 wherein the mapping means replicates the discrete signal of mapped symbols to generate an infinite series of mapped symbols over prescribed time instants covering a time interval from $-\infty$ to $+\infty$.

Claim 85 (new): The device of claim 75 wherein the data symbols are complex symbols associated with a symbol constellation.

Claim 86 (new): The device of claim 75 wherein said interpolation means includes a sampling circuit for sampling the continuous signal to produce a digital signal sample vector; and wherein the cyclic prefix circuit receives the digital signal sample vector from the sampling circuit and prepends the cyclic prefix to the digital signal sample vector.

Claim 87 (new): The device of claim 75, wherein said interpolation means includes a sampling means for sampling the continuous signal to produce a digital signal sample vector, the device further including a digital to analog converter operable to receive the digital signal sample vector and generate an analog signal for transmission.

Claim 88 (new): A communication device for generating an OFDM signal having allocated frequency tones distributed over a predetermined bandwidth, the communication device comprising:

mapping means for receiving data symbols from a symbol constellation and mapping the symbols to prescribed time instants in a time domain symbol duration to generate a discrete signal of mapped symbols;

interpolation means for receiving the discrete signal and generating a continuous signal by applying an interpolation function to the discrete signal;

wherein the interpolation function operates on the discrete signal such that a frequency response of the

continuous signal includes sinusoids having non-zero values at the allocated frequency tones, and zero values at frequency tones other than the allocated frequency tones; and

cyclic prefix means located after the interpolation means for prepending a cyclic prefix.

Claim 89 (new): The communication device of claim 88 wherein the allocated frequency tones are associated with a designated transmitter within the communication system.

Claim 90 (new): The communication device of claim 88 wherein the allocated frequency tones are contiguous frequency tones, and the prescribed time instants are equally spaced time instants uniformly distributed over one symbol duration.

Claim 91 (new): The communication device of claim 88 wherein the allocated frequency tones are equally spaced frequency tones, and the prescribed time instants are equally spaced time instants uniformly distributed over a fraction of one symbol duration.

Claim 92 (new): The communication device of claim 88 wherein the interpolation means includes storage means for storing the interpolation function, the interpolation means retrieving the interpolation function from the storage means and applying the interpolation function to the discrete signal to generate the continuous signal.

Claim 93 (new): A communication device for generating an OFDM signal having allocated frequency tones distributed over a predetermined bandwidth, the communication device comprising:

mapping means for receiving data symbols from a symbol constellation and mapping the symbols to prescribed time instants in a time domain symbol duration to generate a discrete signal of mapped symbols; and

interpolation means for receiving the discrete signal and generates a digital signal sample vector by applying an interpolation function to the discrete signal;

wherein the interpolation function operates on the discrete signal such that a frequency response of the digital signal sample vector includes sinusoids having non-zero values at the allocated frequency tones, and zero values at frequency tones other than the allocated frequency tones; and

cyclic prefix means located after the interpolation means for prepending a cyclic prefix.

Claim 94 (new): The communication device of claim 93 wherein the interpolation means further includes storage means for storing the interpolation function, the interpolation means retrieving the interpolation function from the storage means and applying the interpolation function to the discrete signal to generate a digital signal sample vector.

Claim 95 (new): A communication device for generating an OFDM signal having allocated frequency tones distributed over a predetermined bandwidth, the communication device comprising:

mapping means for receiving data symbols from a symbol constellation and mapping the symbols to prescribed time instants in a time domain symbol duration to generate a discrete signal of mapped symbols; and

interpolation means for receiving the discrete signal and generating a continuous signal by applying an interpolation function to the discrete signal;

wherein the interpolation function operates on the discrete signal such that values of the continuous signal at the prescribed time instants are equal to the mapped symbols; and

cyclic prefix means located after the interpolation means to prepend a cyclic prefix.

Claim 96 (new): A communication device comprising:

mapping means for receiving data symbols and mapping the symbols to prescribed time instants in a time domain symbol duration to generate a discrete signal of mapped symbols; and

interpolation means for receiving the discrete signal and generating a continuous signal by applying an interpolation function that operates on the discrete signal such that a frequency response of the continuous signal includes sinusoids having non-zero values at a first set of tones, and zero values at a second set of tones; and

cyclic prefix means located after the interpolation means to prepend a cyclic prefix.

Claim 97 (new): The communication device of claim 96 wherein the continuous signal comprises an OFDM communication signal and wherein the value of the continuous signal at each of the prescribed time instants is a function of the mapped symbol at said prescribed time instant.

Claim 98 (new): The communication device of claim 96 further comprising sampling means for sampling the continuous signal

at discrete time instants distributed over the time domain symbol duration to generate a digital signal sample vector.

Claim 99 (new): The communication device of claim 98 wherein the discrete time instants are defined within the range of 0, T/N, 2T/N, …, T(N-1)/N, where N is a total number of time instants in the time domain symbol duration.

Claim 100 (new): A communication device comprising:

mapping means for receiving data symbols and mapping the symbols to prescribed time instants in a time domain symbol duration to generate a discrete signal of mapped symbols; and

interpolation means for receiving the discrete signal and generating a digital signal sample vector by applying an interpolation function that operates on the discrete signal such that a frequency response of the digital signal sample vector includes sinusoids having non-zero values at a first set of tones, and zero values at a second set of tones; and

cyclic prefix means located after the interpolation means to prepend a cyclic prefix.

Claim 101 (new): The communication device of claim 100 wherein the interpolation means is adapted to store the interpolation function.

Claim 102 (new): A communications device including a processor configured to implement a communications method, the method comprising:

providing a time domain symbol duration having equally spaced time instants;

allocating a predetermined number of frequency tones to the communication device;

receiving as input data symbols to be transmitted by an OFDM communication signal;

mapping the data symbols to the equally spaced time instants in the symbol duration to generate a discrete signal of mapped symbols;

generating a continuous signal by applying an interpolation function to the discrete signal, the interpolation function operating on the discrete signal such that a frequency response of the continuous signal includes sinusoids having non-zero values at the allocated frequency tones, and zero values at frequency tones other than the allocated frequency tones; and

sampling the continuous signal at discrete time instants distributed over the time domain symbol duration, to generate a digital signal sample vector; and

prepending a cyclic prefix to the digital signal sample vector produced by sampling the continuous signal after generation of the continuous signal by applying the interpolation function.

Claim 103 (new): The communications device of claim 102 wherein the discrete time instants are defined within the range of 0, T/N, 2T/N, …, T(N-1)/N, where N is a total number of time instants in the symbol duration.

Claim 104 (new): The communications device of claim 102 wherein the step of allocating a predetermined number of frequency tones to the communication device further comprises allocating contiguous frequency tones to the communication device.

Claim 105 (new): The communications device of claim 102 wherein the step of allocating a predetermined number of frequency tones to the communication device further comprises allocating equally spaced frequency tones to the communication device.

Claim 106 (new): The communications device of claim 102, wherein the processor is further configured to:

replicate the mapped symbols within the symbol duration to generate an infinite series of data symbols over equally spaced time instants covering a time interval from $-\infty$ to $+\infty$ after the step of mapping the data symbols.

Claim 107 (new): The communications device of claim 106, wherein the processor is further configured to:

apply a sinc interpolation function to the infinite series of data symbols as part of the step of generating the continuous signal.

Claim 108 (new): The communications device of claim 102, wherein said processor is further configured to:

map the data symbols to a block of complex data symbols wherein the block of complex data symbols includes odd numbered symbols and even numbered symbols;

phase rotate each even numbered symbol by $\pi/4$; and

map the block of complex data symbols to equally spaced time instants in the symbol duration to generate the discrete signal of mapped symbols.

Claim 109 (new): The communications device of claim 102 wherein the processor is further configured to:

prepend a cyclic prefix to the digital signal sample vector.

Claim 110 (new): A computer readable medium embodying machine executable instructions for controlling a communications device to implement a communications method, the communications method comprising:

providing a time domain symbol duration having equally spaced time instants;

allocating a predetermined number of frequency tones to the communication device;

receiving as input data symbols to be transmitted by an OFDM communication signal;

mapping the data symbols to the equally spaced time instants in the symbol duration to generate a discrete signal of mapped symbols;

generating a continuous signal by applying an interpolation function to the discrete signal, the interpolation function operating on the discrete signal such that a frequency response of the continuous signal includes sinusoids having non-zero values at the allocated frequency tones, and zero values at frequency tones other than the allocated frequency tones; and

sampling the continuous signal at discrete time instants distributed over the time domain symbol duration, to generate a digital signal sample vector; and

prepending a cyclic prefix to the digital signal sample vector produced by sampling the continuous signal after generation of the continuous signal by applying the interpolation function.

Claim 111 (new): The computer readable medium of claim 110 wherein the discrete time instants are defined within the range of 0, T/N, 2T/N, ..., T(N-1)/N, where N is a total number of time instants in the symbol duration.

Claim 112 (new): The computer readable medium of claim 110 wherein the step of allocating a predetermined number of frequency tones to the communication device further comprises allocating contiguous frequency tones to the communication device.

Claim 113 (new): The computer readable medium of claim 110 wherein the step of allocating a predetermined number of frequency tones to the communication device further comprises allocating equally spaced frequency tones to the communication device.

Claim 114 (new): A computer readable medium embodying machine executable instructions for controlling a communications device to implement a communications method, the communications method comprising:

defining a symbol duration for an OFDM communication signal;

defining time instants in the symbol duration;

allocating frequency tones from the set of tones to a particular communication device;

receiving as input data symbols from a symbol constellation, the data symbols being transmitted by the OFDM communication signal;

mapping the data symbols to the time instants to generate a discrete signal in the time domain;

generating a digital signal sample vector by applying interpolation functions to the discrete signal such that a frequency response of the digital signal sample vector includes sinusoids having non-zero values at allocated frequency tones, and zero values at frequency tones other than the allocated frequency tones; and

prepending a cyclic prefix to the digital signal sample vector after the digital signal sample vector is generated by applying the interpolation function.

Claim 115 (new): The machine readable medium of claim 114 wherein the step of allocating frequency tones further includes allocating contiguous tones, and mapping the data symbols to equally spaced time instants distributed over one symbol duration.

Claim 116 (new): The machine readable medium of claim 114 wherein the step of allocating frequency tones further includes allocating equally spaced tones, and mapping the data symbols to equally spaced time instants distributed over a portion of one symbol duration.

Claim 117 (new): The machine readable medium of claim 114 wherein the data symbols are complex symbols.

Claim 118 (new): A communications device including a processor configured to implement a communications method, the method comprising:

defining a symbol duration for an OFDM communication signal;

defining time instants in the symbol duration;

allocating frequency tones from the set of tones to a particular communication device;

receiving as input data symbols from a symbol constellation, the data symbols being transmitted by the OFDM communication signal;

mapping the data symbols to the time instants to generate a discrete signal in the time domain;

generating a digital signal sample vector by applying interpolation functions to the discrete signal such that a frequency response of the digital signal sample vector includes sinusoids having non-zero values at allocated frequency tones, and zero values at frequency tones other than the allocated frequency tones; and

prepending a cyclic prefix to the digital signal sample vector after the digital signal sample vector is generated by applying the interpolation function.

Claim 119 (new): The communications device of claim 118 wherein the step of allocating frequency tones further includes allocating contiguous tones, and mapping the data symbols to equally spaced time instants distributed over one symbol duration.

Claim 120 (new): The communications device of claim 118 wherein the step of allocating frequency tones further includes allocating equally spaced tones, and mapping the data symbols to equally spaced time instants distributed over a portion of one symbol duration.

Claim 121 (new): The communications device of claim 118 wherein the data symbols are complex symbols.

Claim 122 (new): A communication device for use in a communications system that uses multiple tones distributed over a predetermined bandwidth to communicate data, the device comprising:

mapping means for receiving data symbols and mapping the symbols to prescribed time instants in a predetermined time interval to generate a discrete signal including mapped symbols, each mapped symbol corresponding to a discrete point in time, each discrete point in time to which a symbol is mapped not overlapping a discrete point in time to which another symbol is mapped, multiple symbols being mapped to said predetermined time interval, discrete points in time to which symbols are mapped having a predetermined spacing;

interpolation means for receiving the discrete signal and generates a continuous signal by applying an interpolation function to the discrete signal, the interpolation function operating on the discrete signal such that a frequency response of the continuous signal includes sinusoids having non-zero values at a first set of tones, the first set of tones being a subset of said multiple tones, the non-zero value at each of said first set of tones being a function of a plurality of mapped symbols corresponding to different discrete points in time, the frequency response of the continuous signal also including zero values at a second set of tones, the second set of tones being different from said first set of tones and being another subset of said multiple tones; and

cyclic prefix means located after the interpolation circuit for prepending a cyclic prefix.